

MCEN90031 Applied High Performance Computing

Credit Points:	12.50									
Level:	9 (Graduate/Postgraduate)									
Dates & Locations:	2012, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.									
Time Commitment:	Contact Hours: 36 hours of lectures and workshops Total Time Commitment: 120 hours									
Prerequisites:	Both of the following - <table border="1" data-bbox="387 544 1485 779"> <thead> <tr> <th>Subject</th> <th>Study Period Commencement:</th> <th>Credit Points:</th> </tr> </thead> <tbody> <tr> <td>MAST20029 Engineering Mathematics</td> <td>Summer Term, Semester 1, Semester 2</td> <td>12.50</td> </tr> <tr> <td>COMP20005 Engineering Computation</td> <td>Semester 1, Semester 2</td> <td>12.50</td> </tr> </tbody> </table>	Subject	Study Period Commencement:	Credit Points:	MAST20029 Engineering Mathematics	Summer Term, Semester 1, Semester 2	12.50	COMP20005 Engineering Computation	Semester 1, Semester 2	12.50
Subject	Study Period Commencement:	Credit Points:								
MAST20029 Engineering Mathematics	Summer Term, Semester 1, Semester 2	12.50								
COMP20005 Engineering Computation	Semester 1, Semester 2	12.50								
Corequisites:	None									
Recommended Background Knowledge:	None									
Non Allowed Subjects:	None									
Core Participation Requirements:	<p><p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability</p></p>									
Coordinator:	Dr Stephen Moore									
Contact:	Steve Moore mooresm@unimelb.edu.au (https://mce_host/faces/htdocs/email:mooresm@unimelb.edu.au)									
Subject Overview:	With the ever increasing power of modern computers, the use of computer simulation is becoming more common in engineering practice. This course will introduce topics in high performance computing through a number of applications in science and engineering, including problems in linear algebra, partial differential equations (e.g. computational fluid dynamics), molecular dynamics, and agent based modelling. These applications will necessitate the inclusion of some theory regarding numerical methods for ordinary and partial differential equations (e.g. finite difference and finite element methods), but the key focus of the course will be on how large scale problems can be decomposed onto supercomputing architectures and introducing aspects of large scale visualization.									
Objectives:	At the conclusion of this subject students should be able to - <ul style="list-style-type: none"> • Determine the complexity of a given parallel algorithm • Determine the appropriate architecture for a particular problem and implement code to decompose the problem • Develop numerical methods for solving ordinary and partial differential equations • Implement software for shared memory multi-core systems with the OpenMP application programming interface 									

	<ul style="list-style-type: none"> • Implement software for distributed memory supercomputers with MPI application programming interface
Assessment:	Two assignments due in weeks 7 and 12 (30% each) and an exam (40%).
Prescribed Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	<ul style="list-style-type: none"> • Ability to apply knowledge of basic science and engineering fundamentals. • Ability to undertake problem identification, formulation and solution • Capacity for independent critical thought, rational inquiry and self-directed learning.
Related Course(s):	Bachelor of Engineering (Mechanical and Manufacturing Engineering)
Related Majors/Minors/ Specialisations:	B-ENG Mechanical Engineering stream Master of Engineering (Mechanical) Master of Engineering (Mechatronics)